

CHAPTER 6

THE DRY-CLEANING OPERATION

The dry-cleaning operation is another service activity of the supply department. The supply officer is responsible for providing dry-cleaning service on ships where dry-cleaning equipment is installed. The responsibility for providing this service is normally assigned to a junior Supply Corps officer.

Since water damages certain fabrics, some clothing must be dry cleaned. Dry cleaning is the process by which you immerse soiled and stained garments in dry-cleaning solvent in a dry-cleaning machine. Normally, dry-cleaning equipment is installed on ships with over 500 personnel; however, provisions for dry-cleaning equipment on ships with 100 to 500 personnel are considered on a case-by-case basis.

DRY-CLEANING PERSONNEL

The number of Ship's Servicemen and strikers assigned to the dry-cleaning operation depends on the workload and the equipment. On carriers and tenders where the plant is much larger than on other ships, there may be a supervisor, an assistant supervisor, and 6 to 10 additional personnel.

The petty officer assigned as supervisor is responsible for preparing the dry-cleaning schedule, procuring supplies, training personnel, operating the plant, and cooperating with engineering personnel in maintaining the equipment. The supervisor assigns personnel to do the work as efficiently as possible and rotates them so they can get experience in all the tasks performed in the plant.

DRY-CLEANING SECURITY

All dry-cleaning personnel are responsible for maintaining security in the dry-cleaning plant. Security prevents loss of dry-cleaning articles, damage to equipment, injury to untrained personnel, and unauthorized use of equipment

and facilities. The dry-cleaning plant is considered a Group IV space. Keys should be handled as outlined in chapter 1 of this manual under Group IV spaces. Any work done in the dry-cleaning plant after normal work hours should have the final approval of the ship's store officer.

DRY-CLEANING SCHEDULE

As in the laundry, a schedule is necessary for controlling the delivery, processing, and issuing of dry cleaning. To prepare such a schedule, start with a flow chart of all operations through which articles must pass from the time they are received until they are ready for issue (fig. 6-1). Then

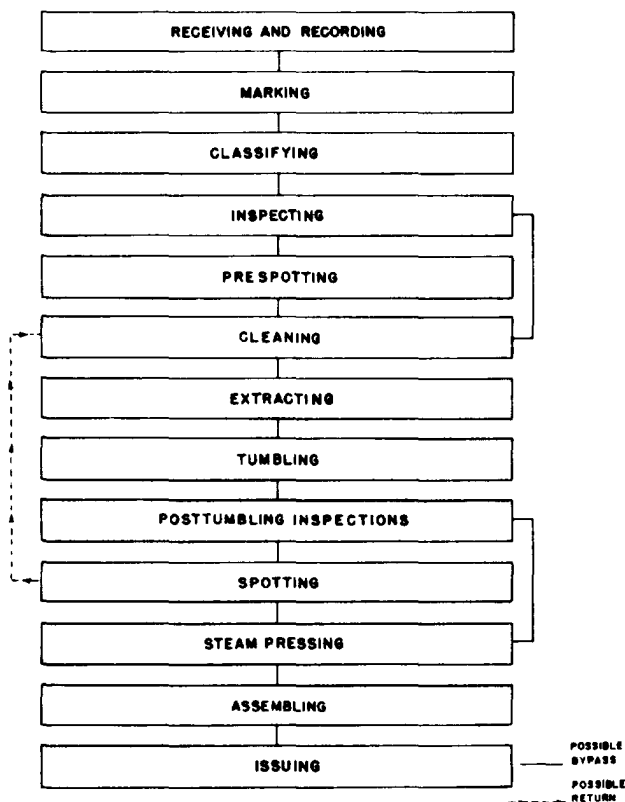


Figure 6-1.—Dry-cleaning flow chart.

review each stage to determine time, space, equipment, and operating personnel required, and any other factors that will affect your schedule.

DRY-CLEANING STANDARDS

Dry-cleaning standards are based on a 96-hour workweek and apply only to those ships that have a dry-cleaning capability. These standards are included in the *Shipboard Habitability Program*, OPNAVINST 9640.1. Your dry-cleaning plant should have dry-cleaning equipment and press capability sufficient to clean and finish press one dress uniform per person per month. This works out to about 1 pound of dry cleaning per person per week. Any troops that are embarked aboard your ship should not be included in dry-cleaning considerations. If your ship has between 100 to 500 personnel, you should have a minimum of a spotting board and press capability to finish press one dress uniform per person per month. Ships with 100 to 500 personnel desiring dry-cleaning equipment instead of a spotting board will be considered on a case basis. If the capabilities of your dry-cleaning plant permit, you may also provide service to ships near your ship. That is, in the case of tenders or repair ships, your ship should provide dry-cleaning service to ships tended in addition to your own.

DRY-CLEANING EQUIPMENT CAPABILITIES

Like the laundry, your equipment capabilities need to be considered when scheduling dry-cleaning operations. Based on observations, information data, and review of past records the following can be expected of your dry-cleaning equipment.

- Dry cleaning—dry to dry—one load rated capacity per 50 minutes
- Dry-cleaning press utility—20 pieces per operator hour (POH)

These equipment capabilities are dependent on training, ability of personnel, arrangement of equipment, and hotel utilities available for your equipment.

SPACE

You should consider the space in the dry-cleaning plant when making your schedule.

Normally, dry-cleaning plants do not have as much space as the ship's laundry and you must have rigid control of the schedule from the standpoint of receiving and issuing so that the section can handle the maximum amount of work in the space available. Do not receive more dry weight than can be processed in 1 normal working day, except under very unusual conditions.

TYPES OF SERVICES

Any services provided in the dry-cleaning plant should be completed in a period between 24 to 72 hours. Services provided for items other than regular uniforms should be clearly defined in your schedule including the days and times these services are available. You should be flexible in scheduling these additional services especially just before a personnel inspection or on a tender or a repair ship that may be offering services to ships alongside while in port. For instance, you should not be doing a large load of civilian clothes at the time of a personnel inspection when your workload will be extra heavy and you won't be able to get the work done on time. Modify the schedule around this time to make sure you get all uniform items done before the inspection.

Normally, officer and CPO clothing can be processed on an individual basis; however, enlisted personnel uniforms may provide too large a demand to do them in this manner. In a situation like this, you may want to handle enlisted personnel uniforms as a bulk (division/group) load. If you do this, make sure each enlisted person marks his or her uniform according to the *U.S. Navy Regulations*, 1973, so you know who owns the clothing.

DEADLINE FOR RECEIPT

To eliminate any problems in receipt or pickup of dry-cleaning items, you should make sure you clearly define on your schedule who is responsible for these tasks. It is advisable to set a deadline for receiving articles no later than 0900 daily. By requiring delivery before 0900, the dry-cleaning personnel can easily sort the articles into proper loads and keep the washer operating to capacity without having to wait for sufficient articles of one type to make a load.

GROUP OR CLASS SCHEDULING

Schedule similar uniform items together because washer loads must be of similar material.

Your material groups are broken down into three categories: (1) officer and CPO uniform items, (2) enlisted uniform items, and (3) miscellaneous items such as flags, foul weather jackets, civilian clothes, and any other items not included in category 1 or 2.

You should do officer and CPO items one day and enlisted uniform items another. Any items other than uniform items can be scheduled out over the week. Thus, on any given day you would have either category 1 or 2 scheduled with two smaller groups of clothing out of category 3. Unless it is necessary, don't ever have more than three different types of material scheduled on any given day. On large ships such as carriers or tenders, the officer and CPO laundry is scheduled on separate days.

ADJUSTING THE SCHEDULE

Unlike the ship's laundry, the schedule in the dry-cleaning plant may have to be adjusted more often to meet specific conditions. As stated earlier, you can expect a synthetic dry-cleaning unit to produce one clean load approximately every 50 minutes. You can also expect to dry clean about 1 pound of laundry per person per week. If you take these two factors into consideration you should be able to determine the number of persons you can serve in a 1-day schedule and adjust the schedule accordingly.

RECEIVING AND IDENTIFYING

The proper receiving and identifying of dry-cleaning articles is essential in preventing items from being misplaced. There are two methods for receiving and identifying dry-cleaning articles. Use the method that best fulfills your needs.

Method A—Each piece of dry-cleaning work is logged in and out using a dry-cleaning work log. The log is maintained by the receiving clerk in a standard ruled book or lined pad of paper. If dry-cleaning tags are used as stated in method B below, this logbook does not need to be used. If your dry-cleaning plant is using dry-cleaning lists without tags, use this log in conjunction with the dry-cleaning list.

Method B—Each patron fills out the list, removes the receipt stub at the bottom, and attaches the list to the bundle. The receiving clerk then tags each article in the bundle with a section

of the premarked tag and staples the master(s) of the tag set and unused tags to the patron's dry-cleaning list.

DRY-CLEANING LIST AND TAGS

A dry-cleaning list is a record of dry cleaning processed for an individual. Such a list saves time and work in receiving and issuing and also reduces the probability of misplacing articles. These lists may be bought commercially or ordered through the *Ship's Store Contract Bulletin*. You may use it to check off finished work returned to the assembly room. The list provides for plant control, customer receipt, financial control, and furnishes eight tags for identifying the items that are going to be dry cleaned. The procedure for using the marking tags that are part of the dry-cleaning list is as follows:

1. Detach and safety pin or staple one tag to each article. If a customer has three articles, fasten a detachable tag to each item and leave the remaining tags attached to the master dry-cleaning list.

2. When you assemble the items that have been dry cleaned, the count of the remaining tags confirms the number of articles that belongs to one customer. Thus if five tags remain, the customer brought in three articles.

Cost columns that are located on the right side of the list are necessary only when a charge is made for dry cleaning.

INSPECTION

Inspect each article for detachable uniform insignia and for items in pockets. Removal of ball-point pens, crayons, lipsticks, and other foreign objects at this point eliminates sources of damage to loads of clothing being cleaned. Put such items in an envelope and attach it to the customer's dry-cleaning list. Return pockets to proper position before cleaning. If you find spots on an article, send it to the spotter. Spots should be removed from the article before it is cleaned.

If time permits, determine whether any buttons or buckles are missing or loose and note tears or any other marks. Note whether the article has a belt. Care in preliminary examination avoids trouble later.

CLASSIFYING

The two most important things to consider when items are classified for dry cleaning are (1) color and (2) lint quality of the material. In general, virtually all fibers or fabrics can be safely dry cleaned provided they are resistant to the dry-cleaning solvent, frictional activity involved in the dry-cleaning machine, and the stress of steam pressing and finishing. Standard military uniforms can be successfully dry cleaned aboard ship with virtually no problems as long as the equipment is used properly and the correct solvent is used. The solvent used should be tetrachloroethylene (perchloroethylene), NSN 6810-00-270-9982 and NSN 6810-00-819-1128. Always remember to classify similar items together for washing purposes. If your dry-cleaning plant is washing civilian clothes, it would be a good dry-cleaning practice to first determine the type of fiber or fabric to be cleaned and then carefully check the permanent care label for manufacturer's recommendations or instructions for cleaning. On occasions you may also dry clean Marine uniforms. Sort them together but dry clean them separately.

Classify table covers, drapes, flags, and so on, according to color, material, and lint quality. (Put ties into separate bags and clean them with the blue uniform.)

Foul weather jackets, face masks, winter helmets, and winter trousers may be cleaned together.

Although they have many different colors, signal flags may be cleaned in the same group. Transfer of lint among flags is not detrimental to their use.

Do NOT dry clean impregnated, rubberized, or oiled articles, or articles manufactured wholly or in part from leather. Dry-cleaning solvents damage such materials beyond repair or use.

When articles are classified, divide them into equal units for loading into the dry-cleaning machine. The weight units should be based on the manufacturer's recommendations for machine capacity.

A record of pounds cleaned and the number of loads cleaned daily is kept to determine the numbers of pounds cleaned per gallon of solvent and the cost per pound cleaned. The use of 1 gallon of dry-cleaning solvent to clean 200 pounds of clothes is considered good usage.

PRESPOTTING

All articles should be examined for spots before they are cleaned. Analyze all spots to determine what substance caused them and what methods should be used to remove them. Sometimes treating the spot may not remove it entirely but usually it will come out completely during the cleaning process.

Note that the flow chart (fig. 6-1) shows both prespotting and postspotting steps. The latter step is necessary in case a spot was missed earlier. If, however, it is necessary to postspot an article, it must go back to be cleaned again to remove the chemical used in spotting. Spotting is discussed in detail later in this chapter.

DRY-CLEANING SOLVENT

The dry-cleaning process centers around the dry-cleaning solvent which distinguishes dry cleaning from simple wet cleaning or laundering. The removal of stains and soils is dependent upon volatility, age and extent of soil, size of wash load, type of fabric, the amount of water and detergent in solution, and the level and temperature of the solvent.

Only the synthetic solvents discussed in this chapter are authorized on board Navy ships for use in dry-cleaning plants. Tetrachloroethylene/perchloroethylene are the most commonly used solvents and the brands are available through supply. The solvents already contain detergent which eliminates adding it to the inventory of supplies.

Check the amounts of solvent in the storage tank from time to time and make sure that it is refilled as necessary. This prevents the solvent from getting too low for operation. If it is necessary, remind the sales office when the quantity of solvent is reaching a low level so they can order a new supply.

SAFE HANDLING AND USE OF DRY-CLEANING SOLVENT

Although dry-cleaning solvent has been used safely for many years, it is a toxic substance. It must, like other chlorinated solvents, be regarded as a potentially hazardous material, which, if misused or improperly handled, can cause serious injury or even death. It is essential, therefore, that perchloroethylene be handled only by knowledgeable and experienced individuals who are familiar

with the hazards associated with its use. The safety hazards of perchloroethylene are contained in BUMEDINST 6260.12.

Many incidents have been reported where Ship's Servicemen were overcome by fumes from dry-cleaning solvent. To prevent and minimize the hazards of handling dry-cleaning solvent, you must follow these precautions:

- Use solvent only in well-ventilated spaces.
- Avoid prolonged or repeated breathing of vapors.
- Ventilate stowage areas well.
- Free exhaust ducts, fans, and ventilation shafts of dirt, lint, or other debris.
- Vent vapor recovery units to the outside air.

In addition to the above precautions you should inspect your equipment daily for loose or leaky joints, couplings, connections, valves, covers, or doors and report all discrepancies promptly to maintenance personnel. Do not eat, drink, or smoke in areas where the dry-cleaning solvent is handled.

Any liquid solvent, even a trickle that comes in contact with the atmosphere, presents a potential hazard to personnel. If spills occur, they should be cleaned up promptly. Personnel who clean spills should wear rubber gloves and an approved respiratory protection device that is equipped with a canister or filter suitable for use with chlorinated vapors. Personnel not wearing rubber gloves or respirators should remain clear of areas where spills have occurred. Open all doors and turn on exhaust fans to ventilate the area.

You should use a sorbent to clean up small spills. Allow the sorbent to stay in place until it has completely absorbed the solvent and then shovel the solvent-laden material into an airtight container and dispose of it properly. If a large spill occurs, it should be drained and then pumped into an airtight container for disposal. The dry-cleaning solvent should not be dumped into sewers, placed near water supplies, nor should it be drained into the bilges. It should be placed in a suitable container and disposed of in one of the following ways:

- Released to a licensed reclaimer

- Incinerated in an approved incinerator
- Evaporated in very small quantities
- Buried in landfills in compliance with local, state, and federal regulations

Dumping the solvent into any body of water is strongly discouraged and may be illegal. No personnel should be allowed to return to any areas where spills have occurred until all evidence of excessive vapors is gone.

HEALTH HAZARDS

Perchloroethylene can be used safely when proper precautions are observed; however, the user must guard against certain hazardous properties of the solvent. Users should guard against inhalation of excessive perchloroethylene vapor, prolonged or repeated contact of the liquid with the skin, swallowing the liquid, and splashing into the eyes. Manufacturers of dry-cleaning equipment design and build their dry-cleaning systems with these points in mind. When such equipment is operated and maintained in an appropriate manner, dry-cleaning solvent should not become a health hazard.

Dry-cleaning supervisors should make sure a buddy system is adopted in the dry-cleaning operation. All dry-cleaning personnel should be alert for the signs of overexposure or illness caused by the dry-cleaning solvent including the following:

- Loss of inhibitions, lightheadedness, giddiness, or drunkenness
- Loss of coordination
- Stinging sensation in the eyes, nose, or throat
- Headache, nausea, or dizziness

FIRST AID

All personnel who work in areas where overexposure to perchloroethylene could occur should be thoroughly trained in administering appropriate emergency first aid. Experience has shown that promptly administering such aid can help to reduce the possible adverse effects of accidental exposure. You must realize, however, that first aid is for emergency treatment only and medical attention should be obtained promptly.

Inhalation

The initial effects of overexposure due to inhaling the solvent will be nose and eye irritation, lightheadedness, dizziness, mental dullness, and uncoordination. If these symptoms are present, the affected person should be removed from the contaminated area to fresh air. Once the person is removed to an area where there is fresh air, recovery is usually rapid. If recovery is not rapid, symptoms worsen, or breathing has stopped, start artificial respiration and obtain medical attention at once.

Skin Contact

Perchloroethylene is an excellent solvent and because of this it removes natural oils from the skin. Prolonged and/or repeated contact with the liquid may produce rough and dry skin which is more susceptible to infections. Exposures that are infrequent or of short duration should have no adverse effects; however, in some persons a mild irritation, consisting of a mild temporary redness, may occur.

There is little practical hazard from the standpoint of skin absorption. Although perchloroethylene can penetrate the human skin

in toxic quantities following massive or prolonged exposure, there is little absorption through the skin under normal conditions of use. Personnel whose skin comes in contact with the solvent should wash the affected area with large amounts of warm water and soap. Any contaminated clothes should be removed and dry cleaned.

Eye Contact

While the danger of serious injury is little or none if perchloroethylene is splashed into the eyes, a great deal of pain and redness may result. The eyes should always be flushed or rinsed with cool water immediately after contact and immediate medical attention sought.

STOWAGE OF THE DRY-CLEANING SOLVENT

NSTM S9086-WK-STM-010 of Sept 87 contains stowage requirements for chlorinated cleaning solvents. Chapter 670 includes the stowage, handling, and disposal of hazardous general-use consumables. Do not stow tetrachloroethylene (perchloroethylene) near heat sources, or allow contact with hot surfaces. Do



Figure 6-2.-Multimatic dry-cleaning machine.

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not smoke in areas where dry-cleaning solvent is stowed or used. All stowage areas should be well ventilated and checked regularly by the gas-free engineer. Do not stow dry-cleaning solvent near any substance that the solvent is not compatible with including strong alkalies such as sodium hydroxide, oxidizers such as calcium hypochlorite and sodium nitrate, or powdered metals such as aluminum.

SANITATION

To protect themselves, personnel working in the dry-cleaning plant where they are exposed to dry-cleaning solvents should receive a physical examination on a schedule determined by the medical officer. Dry-cleaning personnel should wear clean uniforms, maintain good personal hygiene, and wash hands frequently, especially after visiting head facilities or handling soiled clothing.

Dry-cleaning facilities should be kept in a clean and sanitary condition at all times. The medical officer should provide the dry-cleaning plant with sanitation instructions and inspect the dry-cleaning areas frequently. The medical officer should also provide a copy of the sanitation instructions to be posted in plain view in the dry-cleaning area.

DRY-CLEANING EQUIPMENT

Dry cleaning, in spite of its name, is a washing process. Steps in the process are roughly similar to those for washing with water, but the differences are important. The equipment used in dry-cleaning fabrics is listed in the Naval Sea Systems Command's *Navy Laundry and Dry-Cleaning Equipment Catalog* and is currently used in shipboard dry-cleaning plants.

DRY-CLEANING MACHINE

The dry-cleaning machines shown in figures 6-2 and 6-3 are generally used on most Navy ships.

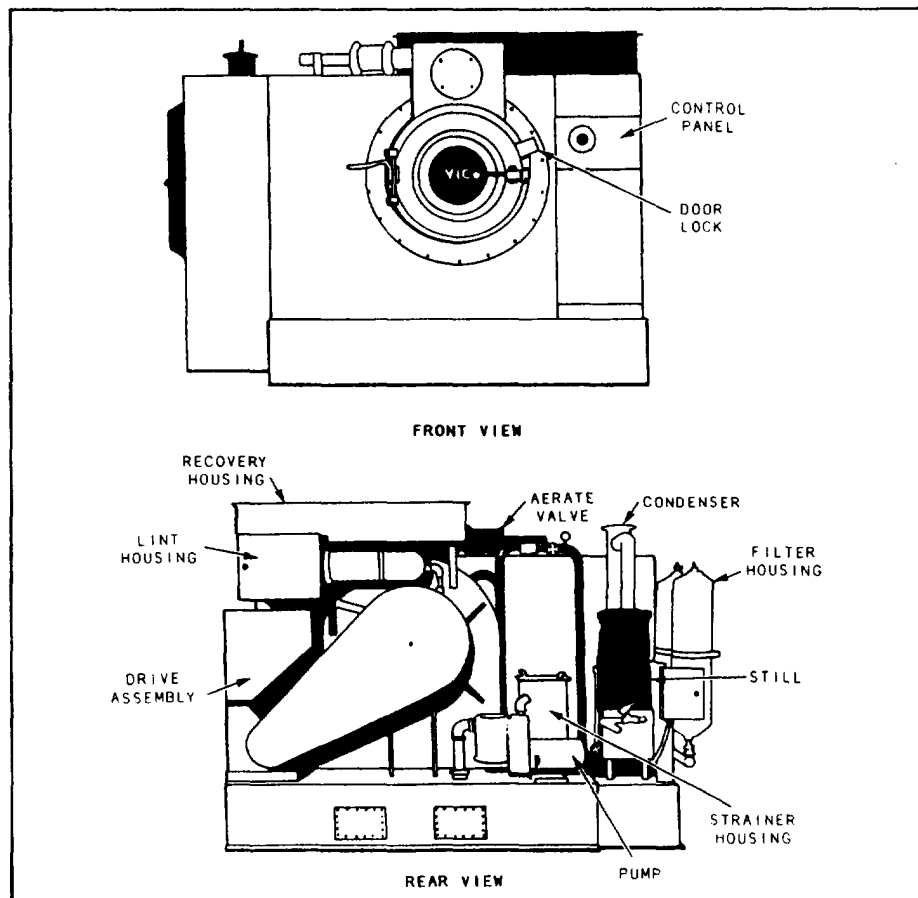


Figure 6-3.—VIC dry-cleaning machine.

Although they look different, they basically operate on the same principles. The dry-cleaning machine shown in figure 6-2 is commonly called the multimatic (Model Solo) and has a load capacity of 30 pounds. The dry-cleaning machine shown in figure 6-3 is the VIC model manufactured by the VIC Manufacturing Company and the components are shown for your reference.

The dry-cleaning units used today are much easier and safer to operate than machines used in the past. They eliminate the job of moving solvent-laden clothes from one machine to another. You simply load the machine and when the cycle is complete clothes are dry and ready to press. This lowers the risk of solvent exposure. Listed below is basically what happens to a load during a complete cycle:

1. The load is placed in the washer basket, where solvent and soap, with the motion of the machine, carry on the initial washing process.
2. The solvent travels in a cycle through the washing basket into the filter—where much of the

dirt it has collected is removed—and back into the washer, where the load is rinsed.

3. A portion of the solvent is drained off after it passes through the filter. This solvent enters the distilling unit, where it is completely purified. This is done by heating the solvent until it vaporizes. The vapor is then run over cold pipes to lower its temperature rapidly and return it to a liquid state. After distilling, the solvent again enters the washing cycle. By this means the total amount of solvent in the machine is kept at an acceptable level of purity for a long time.

4. At the end of the washing-rinsing period, the flow of solvent is automatically shut off and the machine spins to extract the solvent from the load.

5. After extraction, any remaining solvent is reclaimed during the drying process. This is done by tumbling the garments in a stream of warm air that vaporizes the solvent. The solvent-laden air is passed over a cooling coil, condensed into liquid solvent, and returned to the stowage tank for reuse. The length of the drying cycle depends

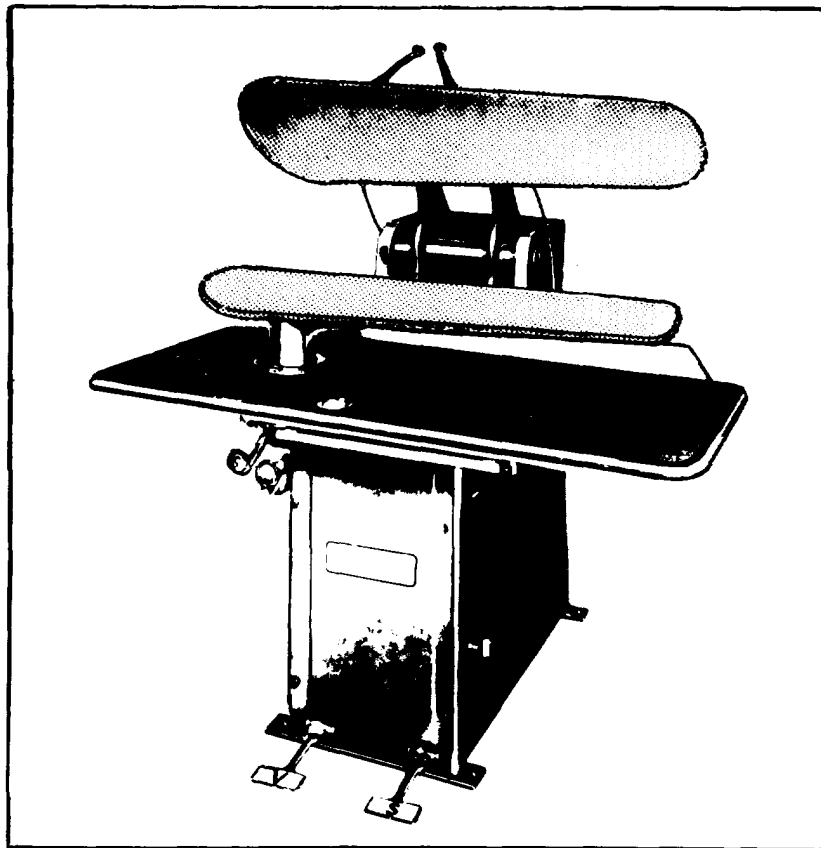


Figure 6-4.—Dry-cleaning press.

on the setting of the temperature on the thermostat. Until the temperature setting is reached, the drying cycle continues (normally about 12 minutes). The temperature setting, depending on the garment, should be set between 140° to 150°F.

6. Once the desired temperature is reached and the bulk of the solvent reclaimed, the clothes are treated with a stream of fresh air. This portion of the dry-cleaning process is the deodorizing cycle that strips away any remaining odor or solvent vapor that may still be left in the clothes.

DRY-CLEANING PRESSES

Dry-cleaning presses have perforated metal heads and bucks through which steam is admitted by the operator. The heads are normally covered with a perforated, thin, metal mask, which is sometimes also covered with a moleskin type of fabric to prevent a gloss on pressed articles. The bucks are usually padded and are then covered with a perforated metal mask and a cloth covering.

Presses used for dry cleaning aboard ship are listed in the *Navy Laundry and Dry-cleaning Catalog*, NAVSEA S6152-B1-CAT-010. There are two general utility dry-cleaning presses listed, one made by Ajax and the other by Florenta. The Ajax model is shown in figure 6-4. This model is very easy to operate. After dressing an article on the buck, the operator raises the head closing bar to close the head. Then, pressing the head locking handle with the other hand, the operator locks the head in the pressing position. Simply pressing the table-mounted release button will open the head at anytime. Steam can be provided to the head by pressing the steam handle located on the head, and buck steam and vacuum are supplied by depressing the two foot pedals.

The Florenta dry-cleaning press uses the hand control buttons in conjunction with the safety control bar. The operator pushes the black buttons on each side of the worktable facing with both hands. This will close the pressing head unless the safety control bar contacts an object or the buttons are released before the head is closed. To open the press head, the operator simply lifts up on the safety control bar and the press head will open to the full position. The two control buttons on the worktable facing are not used in the opening of the pressing head. The head steam and buck steam and vacuum are operated in the same manner as previously described.

Synthetic uniforms should not be pressed on HOT HEAD presses (uncovered polished steel). Synthetics cannot withstand high temperatures and, therefore, should be done on a dry-cleaning press.

Steam lines under no more than 75 to 80 pounds per square inch pressure should be connected to dry-cleaning presses. At this pressure the proper amount of moisture and heat is available to properly press the item of apparel.

CAUTION is required in pressing fabrics containing high percentages of either Dacron polyester fibers or Orion acrylic fibers because control of temperature, pressure, and time is important. For best results 100 percent Dacron and Orlon fabrics should be pressed at temperatures around 275°F with low mechanical pressure and short intervals of time. In blends of Dacron with wool, higher temperatures may be used provided the mechanical pressure and contact time are kept at a minimum. Improper pressing techniques may result in a shiny, watered, clouded, or frosted appearance, needle holes, and difficulty in altering the finished garment at some later date. If high steam pressures are used, it is doubtful that pressed seams can subsequently be altered. Permanent damage results from the defects discussed above because they cannot be removed by sponging or other treatment.

PRESS LAYS

In machine pressing, each garment is finished by a series of lays. Each lay is a position of the garment on the buck, and the series should cover the entire garment. Places on the garment that cannot be pressed with the machine should be smoothed out by inserting a puff (pad) and pressing the spot against the head of the press or by using a hand iron.

All pressers do not follow the same pattern for pressing the same article. Generally there is not much variation in different lays. Sequences of lays for trousers tops and legs, jumpers, and uniform coats are described in the following pages. The ones given are considered the minimum for each article when high-quality pressing is desired.

Trouser Tops

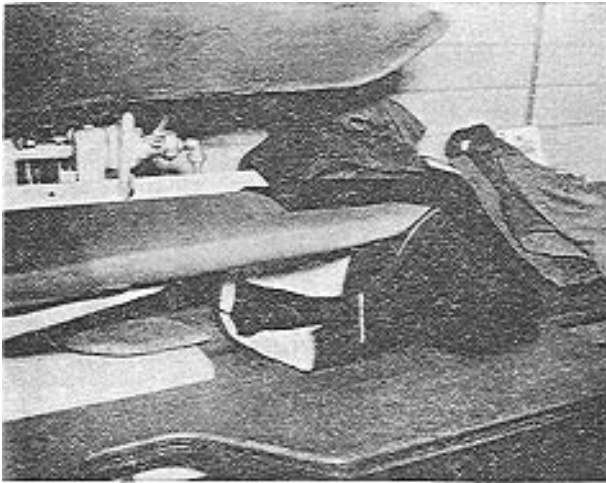
Figure 6-5 gives the sequence of lays for pressing trouser tops. With the fly open (lay No. 1), draw the left trouser top over the small end of the buck, having the fly front almost even with the front edge of the buck. Steam by using the head and applying light pressure, then dry thoroughly with the vacuum.

Again place the left trouser top on the small end of the buck as shown in lay No. 2. The pocket should be in the center of the buck. Straighten the pocket and make certain that the outer edge is even and drawn together. Steam, press, and dry the lay.

In lay No. 3, the left side pocket is even with the front edge of the machine and the back center seam is even with the rear edge of the buck. The left hip pocket lies in the center of the buck. Steam the material lightly and pull the pocket together.

In making lay No. 4, draw the trouser top over the small end of the buck so that the end of the buck fits well down into the seat of the trousers and the back seam is directly in the center of the buck. Apply steam and light pressure and vacuum dry.

In making lay Nos. 5, 6, and 7, continue on around the trouser top, pressing the right side. These lays are not shown as they correspond closely to lays 3, 2, and 1.



LAY 1 - LEFT FLY FRONT



LAY 2 - LEFT SIDE POCKET



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Figure 6-5.-Lays for pressing trouser tops.

When available, the automatic topper press may be used to press trouser tops. The topper press eliminates the need for lays discussed above and also speeds up production. This type of press is discussed later.

Trouser Legs

Lays for pressing trouser legs are given in figure 6-6. The first step is to place the front portion of the left leg on the buck—crotch at the large end, the inside of the leg facing upward, the seams lying on the center of the buck (see lay No. 1). Make sure that one seam rests upon the other for the entire length of the leg. Apply steam to soften the material and straighten the knee.

Lay the left leg, as shown in lay No. 2, on the front of the buck so that the front crease is in the center of the buck and the top of the trouser is at the large end of the buck in a line with the second or third button of the fly (or, if zippered, 2 or 3 inches from the bottom) in position so the crease will extend upward as far as possible.

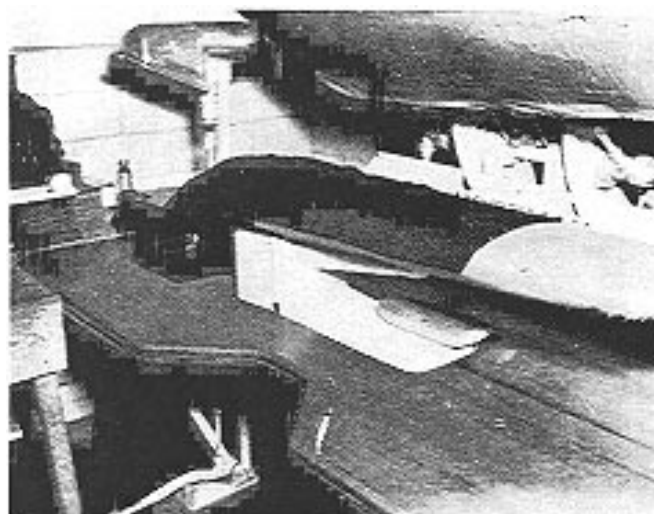
In lay No. 3, move the trouser leg to the rear of the buck so that the back crease is lying on the center of the buck. The leg should be placed so that at least 4 inches of the seat will be creased. Extend the crease as high as possible without wrinkling the crotch.

Lay Nos. 4 (right leg, front portion), 5 (right leg front crease), and 6 (right leg rear crease) are substantially the same as lays 1, 2, and 3 of figure 6-6.

Uniform Coats

Check figure 6-7 (lays 1 through 6) and figure 6-8 (lays 7, 11, and 13) for the lays used in pressing uniforms coats. Place the left side of the coat collar and the left lapel on the rear of the large end of the buck and press as shown in lay No. 1. This operation shrinks the collar at the gorge seam, restoring the shape of the garment where it tends to stretch, from the seam at the shoulder down to about 5 inches below the gorge seam. Lay No. 2 is similar to lay No. 1 except that the right side of the collar and the right lapel are pressed. Make this lay on the front of the large end of the buck. Lay Nos. 1 and 2 serve to restore the balance of the coat so that the left front and right front hang evenly.

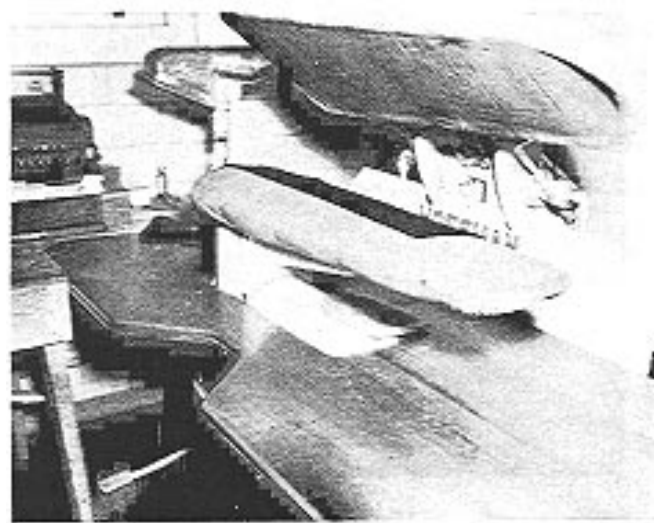
After creasing the two sides of the collar, place the collar on the large end of the buck (see lay No. 3) so that the center is on the center line of the buck. In most cases the collar is stretched while



LAY 1 - LEFT LEG FRONT PORTION

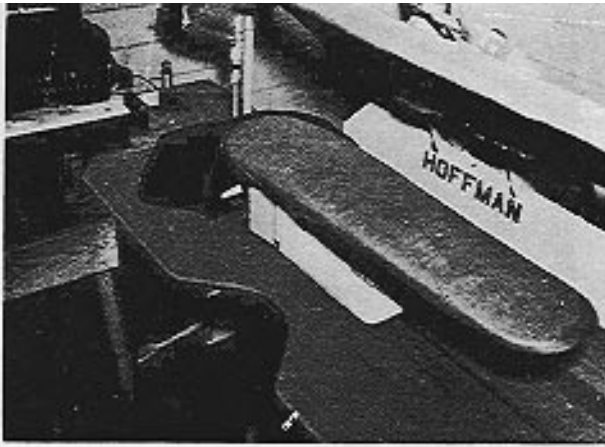


LAY 2 - LEFT LEG FRONT CREASE

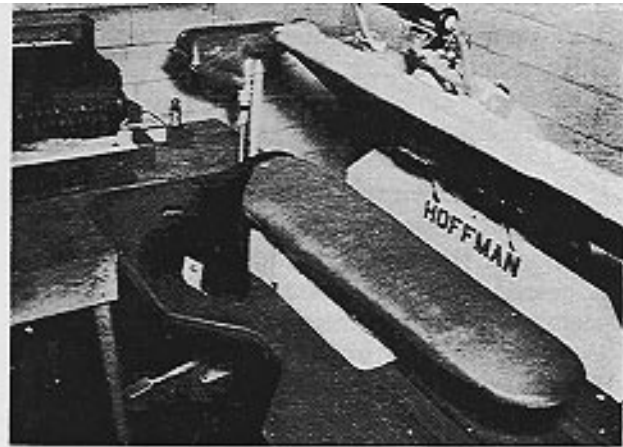


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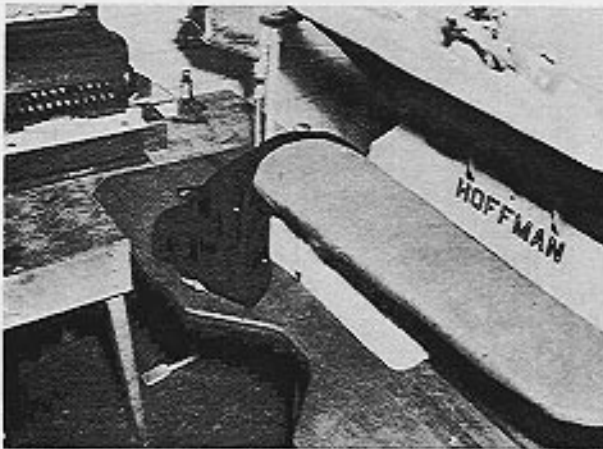
Figure 6-6.—Lays for pressing trouser legs.



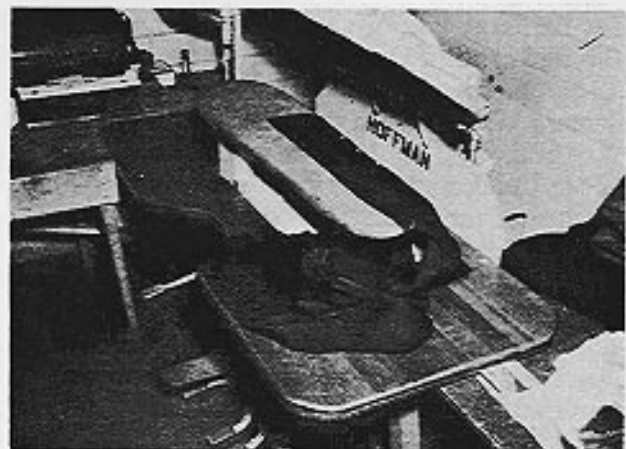
LAY 1 – LEFT SIDE OF COLLAR



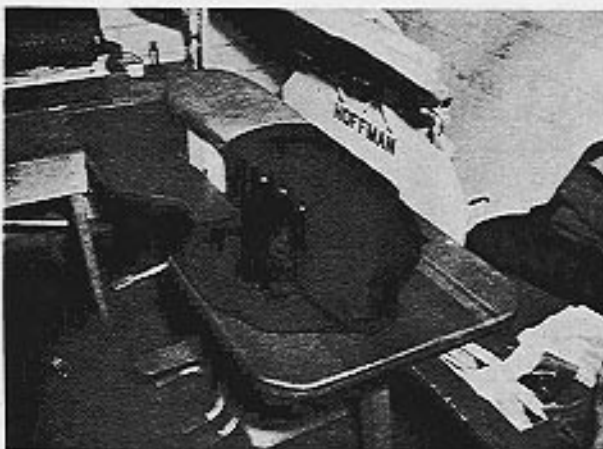
LAY 2 – RIGHT SIDE OF COLLAR



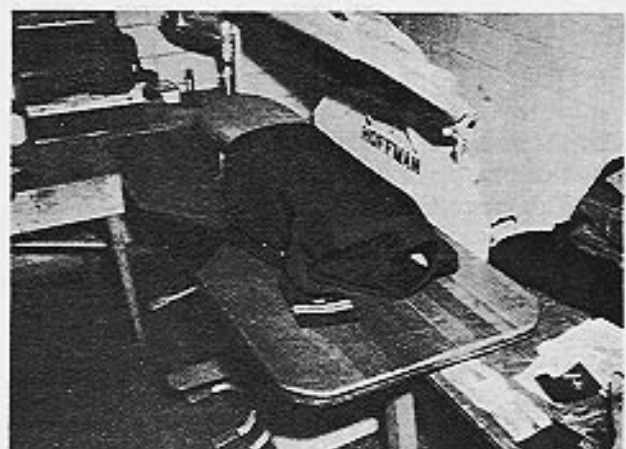
LAY 3 – CENTER SEAM OF COLLAR



LAY 4 – RIGHT FRONT EDGE



LAY 5 – RIGHT SIDE AND POCKET



LAY 6 – RIGHT HALF OF BACK

119.37.1

Figure 6-7.-Lays 1 through 6 for pressing uniform coats.



LAY 7 - CENTER SEAM OF BACK



LAY 11 - COAT FACINGS



LAY 13 - SLEEVES, ROLLED

119.37.2

Figure 6-8.-Lays 7, 11, and 13 for pressing uniform coats.

being worn. Distribute the extra fullness over the length of the collar and steam freely.

In lay No. 4, place the right front of the coat at an angle to bring out the chest. Never stretch the front of the coat; gather in the front slightly and shrink it to the proper length. Steam well before applying pressure, then vacuum dry.

See that the pocket is smooth. Move the coat forward on the buck for lay No. 5. The small end of the buck fits into the chest about 1 inch below the armhole pit and within 2 or 3 inches of the side seam. Any fullness on the dart seam should be taken in between the pocket and the armhole pit.

In lay No. 6, place the right half of the back on the buck so that the lay is about 1 inch from the right armhole and about 2 inches below the collar. The side seam slants in from the armhole;

the bottom of the seam is about 4 inches from the front edge of the buck.

The center seam in the back of the coat should be placed in the center line of the buck for lay No. 7 (fig. 6-8). See that the bottom edge of the under collar is placed even with the edge of the buck. Any fullness in the center seam between the shoulders should be taken in.

Continue on around the coat, making lay No. 8 (left half of coat back), lay No. 9 (left side and pocket), and lay No. 10 (left front edge) to correspond to lays 6, 5, and 4.

Place the right facing of the coat front on the buck, facing up as shown in lay No. 11. This lay takes in the coat edge from the bottom of the coat

to a point below the gorge seam. Lay No. 12, for the left facing, is the same as No. 11.

Insert the sleeve former as shown in lay No. 13 and place on the buck for press. Bring the press head down for light contact only and steam from the head and the buck and then apply vacuum until dry. Turn the sleeve over without removing the former and repeat on the other side. The same methods are applied for the right sleeve. Visible creases from previous pressing can be removed by rubbing on the buck and steaming with the former still in the sleeve. For stubborn creases, wet with a damp cloth, allow to dry, and press as above.

Fit the shoulder pad into the sleeve head at the back seam. After spreading the fullness evenly, apply steam and then hold lightly against the head allowing the heat to press out the fullness. Next follow around to the front of the sleeve, getting in far enough to take care of the wrinkles. Work out the wrinkles in the other shoulder.

Dry-cleaning plants on board some Navy ships are equipped with a steam air finisher. This equipment can be used to do suit coats and increase work output. This equipment is discussed later in this chapter.

Enlisted Men's Trousers

Figure 6-9 shows the sequence of lays for pressing enlisted men's trousers. The procedure is the same for both blues and whites.

Turn the trousers inside out for the entire pressing operation. Place the left front of the trousers on the small end of the buck, smooth out the flap, and then apply steam and vacuum dry. See lay No. 1.

In lay No. 2, the left side back is placed on the small end of the buck, even with the side crease. Smooth out all wrinkles, apply steam freely, and vacuum dry.

In making lay No. 3, draw the trouser top over the small end of the buck so that the end of the buck fits well into the seat of the trousers and the back seam is directly in the center of the buck. Apply steam and light pressure and vacuum dry.

In making lay No. 4 and lay No. 5, continue on around the trouser top. These lays are not shown as they correspond closely to lay Nos. 2 and 1.

In lay No. 6, place the front portion of the left leg on the buck, crotch at the large end. With the seam facing up, running parallel to inside crease, apply light pressure and vacuum dry.

Lay the left leg, as shown in lay No. 7, at the rear of the buck, so the outside crease is in the

center of the buck in line with the bottom of flap, to avoid crushing buttons, Apply steam fully to take out fullness of knee and vacuum dry.

Lay No. 8 (right leg, front portion) and lay No. 9 (right leg, outside crease) are substantially the same as lay Nos. 7 and 6.

Enlisted Men's Jumpers

Figures 6-10 and 6-11 give the sequence of lays for pressing enlisted men's jumpers. The procedure is the same for both blues and whites.

Turn the jumper inside out for the entire pressing operation. Place the body of the jumper on the center of the buck. Apply light pressure, steam, and vacuum dry. See lay No. 1.

Place the right side of the jumper on the small end of the buck (lay No. 2), extending from shoulder to bottom. Insert your right hand into the shoulder seam, smoothing out wrinkles. Apply steam and vacuum dry.

In lay No. 3, place the center of the jumper on the small end of the buck about 6 inches above the vee. Apply light pressure, steam, and vacuum dry.

Lay No. 4 is pressed in the same manner as lay No. 2.

Place the sleeve in the center of the small end of the buck as shown in lay No. 5, making sure creases correspond with the body crease and the shoulder crease. Smooth out all the wrinkles by applying light pressure to avoid crushing buttons on cuffs.

Lay No. 6 is pressed in the same manner as lay No. 5.

In lay No. 7, place the collar in the center of the buck and fold the sides to meet in the center as shown in lay No. 7. Apply plenty of pressure. Then fold the collar again so that the two outside creases are matched evenly. Place on the center of the buck and apply plenty of pressure. See lay No. 8.

In lay No. 9, fold the jumper in the center so that both sides of the jumper match. Place the center fold on the buck, apply light pressure, steam freely, and vacuum dry.

STEAM AIR FINISHER

When available, use the steam air finisher to finish such items as coats, overcoats, peacoats, and foul weather jackets. There are three styles of air finishers installed aboard Navy vessels. The



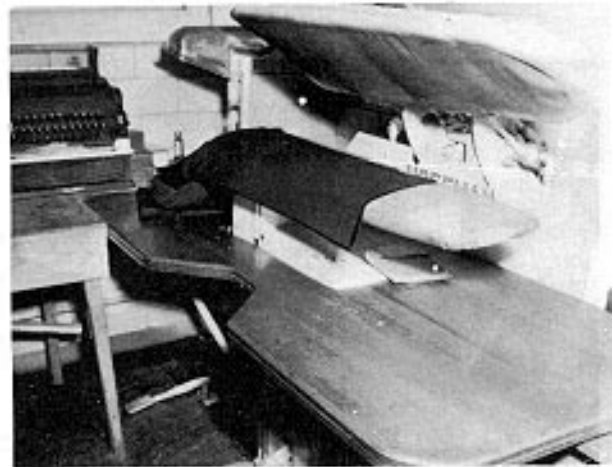
LAY 1 - LEFT SIDE FRONT



LAY 2 - LEFT SIDE BACK



LAY 3 - CENTER SEAM



LAY 6 - LEFT LEG FRONT PORTION



LAY 7 - LEFT LEG OUTSIDE PORTION

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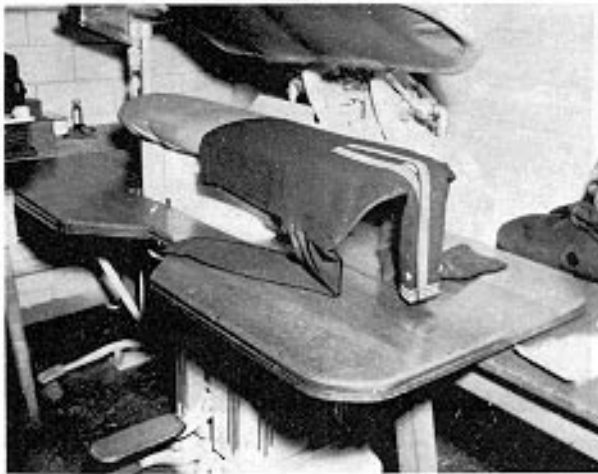
Figure 6-9.-Lays for pressing enlisted men's trousers.



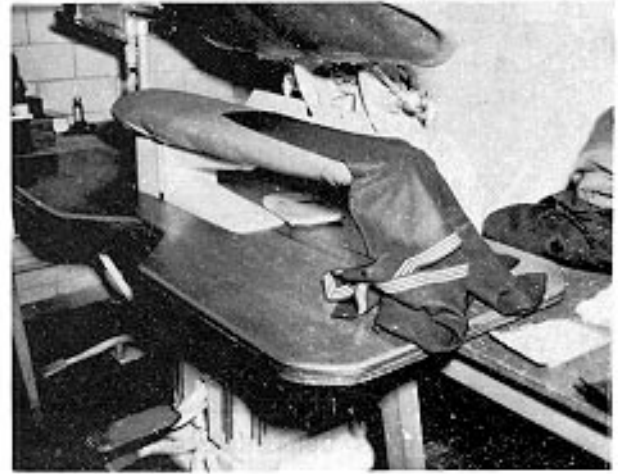
LAY 1 – BODY OF JUMPER



LAY 2 – RIGHT SIDE OF JUMPER



LAY 3 – CENTER OF JUMPER



LAY 5 – LEFT SLEEVE

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Figure 6-10.-Lays 1, 2, 3, and 5 for pressing enlisted men's jumpers.

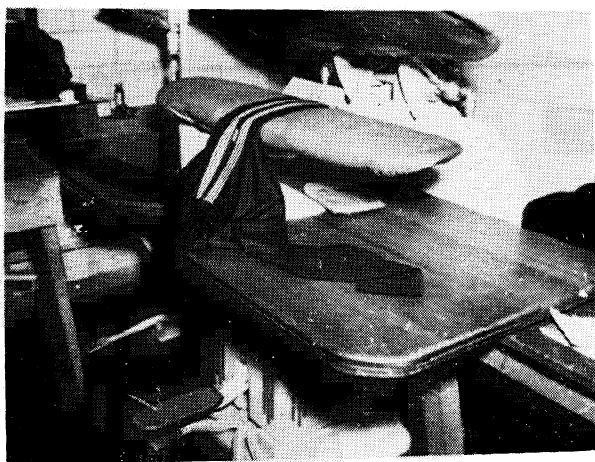
Ajax model is illustrated in figure 6-12. These air finishers make jobs in large dry-cleaning plants quicker and more efficient.

Controls and Indicators

The controls and indicators you will be concerned with are illustrated in figure 6-13. Table 6-1 illustrates the purpose and use of these controls and indicators. Controls and indicators may vary between models; however, the operating principle is the same. Always refer to your technical manual for correct operating procedures.

Operation of the Steam Air Finisher

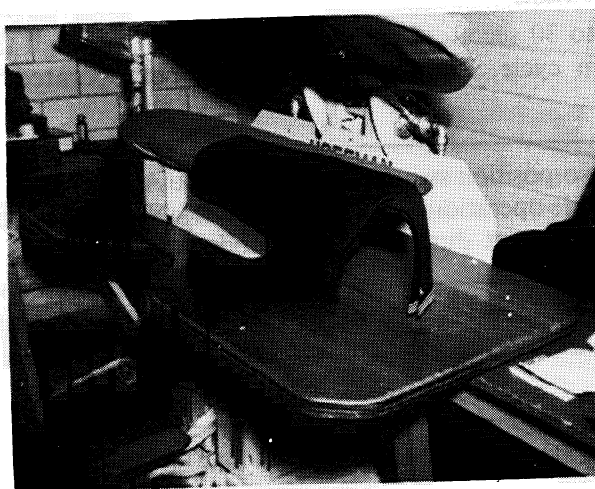
To eliminate problems, you should always operate the air finisher in the automatic mode. During automatic operation, the duration of the steam and hot air cycles is controlled by the steam timer and air timer settings. The amount of time to set each control depends on the type of material. For most clothing items set the steam timer for 12 seconds and the air timer for 15 seconds. If the finisher is set at 0 or above 30 on either timer, it will not operate.



LAY 7 - COLLAR



LAY 8 - COLLAR



LAY 9 - CENTER CREASE

Figure 6-11.—Lays 7, 8, and 9 for pressing enlisted men's jumpers.

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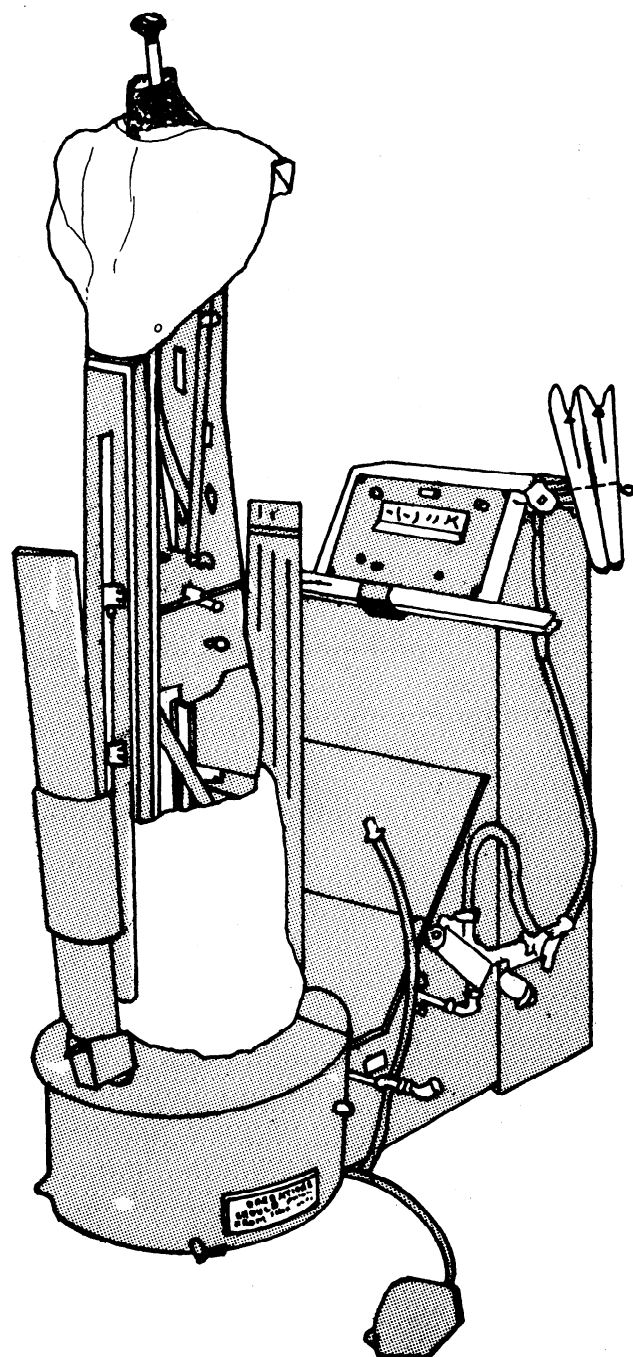
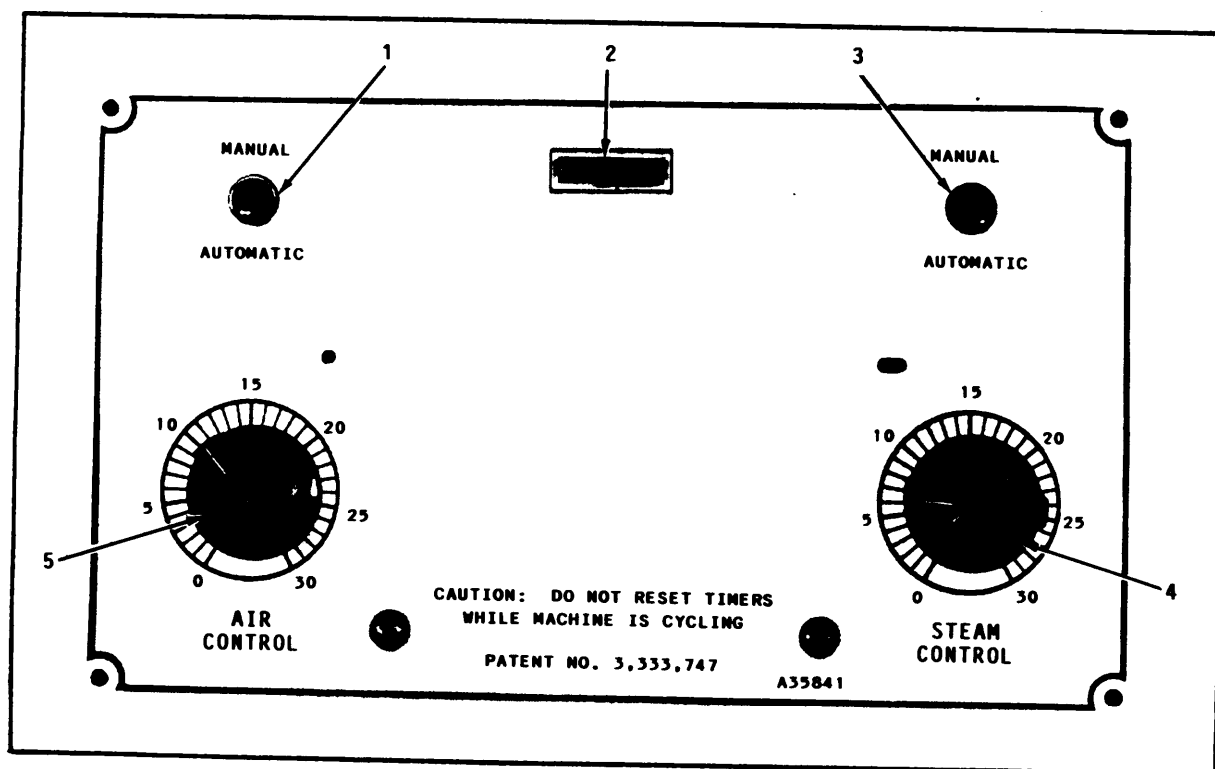


Figure 6-12.—Steam air finisher.

Loading the Steam Air Finisher

The following are basic procedures for loading a coat onto a steam air finisher. Overcoats, peacoats, and foul weather jackets are finished in basically the same way.

1. With shoulder expanders in and collar form in the down position, place the coat on the form.



- | | |
|------------------------------|------------------------|
| 1. Air control mode switch | 4. Steam control timer |
| 2. Neon signal indicator | 5. Air control timer |
| 3. Steam control mode switch | |

Figure 6-13.—Steam air finisher controls and indicators.

Table 6-1.—Purpose of Controls and Indicators

CONTROL	PURPOSE AND USE
AIR control timer	Sets the length of time (0 to 30 seconds) hot air will be blown through the garment following a steam cycle. Functions only if finisher operated in automatic mode.
AIR toggle switch	The AIR toggle switch is a two-position switch. Placing it in the AUTOMATIC position selects automatic mode operation. Placing it in the MANUAL position valves hot air through the garment during manual mode operation.
Neon signal indicator	Operative only during automatic mode operation. Lights to indicate steam or hot air is being blown through the garment and either steam or hot air timer is timing out.
STEAM toggle switch	The STEAM toggle switch is a two-position switch. Placing it in the AUTOMATIC position selects automatic mode operation. Placing it in the MANUAL position valves steam through the garment during manual mode operation.
STEAM control timer	Sets the length of time (0 to 30 seconds) steam will be blown through the garment. Functions only if finisher operates in automatic mode.

Adjust the shoulder of the form to fit the garment by pushing down on the knob at the top of form. Insert your hands in the pockets to straighten the linings and the pocket flaps.

2. Overlap the front of the jacket with the buttons outside and hold the coat firmly, closing the front flap with the knee.

3. Check and correct the back collar making sure there is no exposed facing and snap the collar form back.

4. Close the vents using the hand vent clamps, one clamp for each vent.

5. Start the steam before you insert the sleeves by releasing the foot switch. Once the steam is discharging freely from the sleeves, stop steam by pressing down on the foot switch. This automatically resets the steam cycle timer.

6. Keeping your foot on the switch, insert wood bars in the sleeves along the seam to within 2 inches of the armpit.

7. Release the foot switch to start the automatic cycle. The automatic cycle can be stopped anytime by stepping on the foot switch.

8. When the automatic cycle is complete, the red light goes off. Remove the vent clamps, release the foot clamp, remove the sleeves, and remove the coat.

The operating procedures above may vary slightly between models, but you should always consult your manufacturer's technical manual for the correct operating procedures.

AUTOMATIC PANTS TOPPER

When available, use the automatic pants topper shown in figure 6-14 to speed up

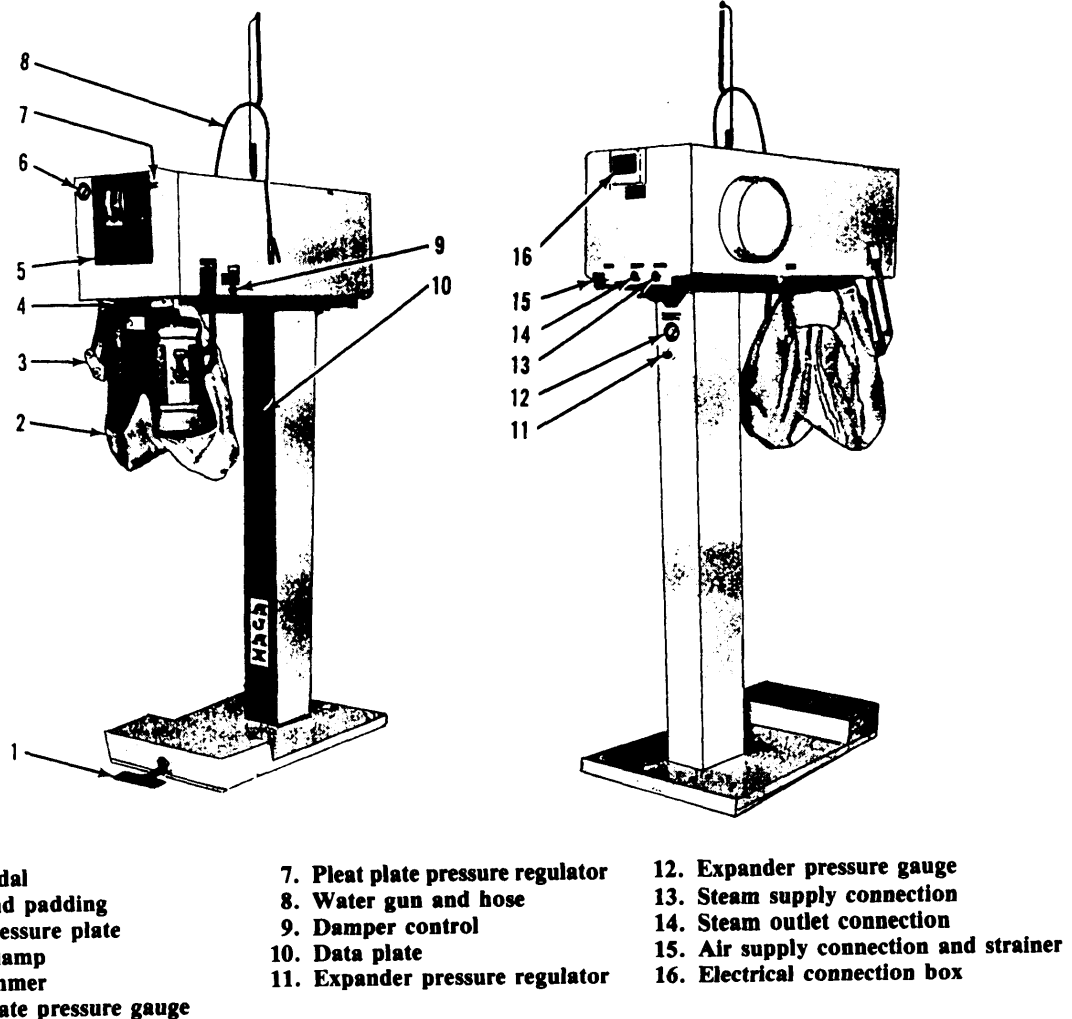


Figure 6-14.—Automatic pants topper.

production of trouser tops. The automatic pants topper is quicker and eliminates the several lays required to finish trouser tops on a conventional press by using air and steam. Steam and air are set automatically and then released into the air bag for a desired period of time in which the trouser tops are finished. The pants topper can be run manually or automatically. Refer to your technical manual for correct operating procedures.

ASSEMBLING AND ISSUING

When you finish pressing the clothes, you get them ready for issuing. Use the dry-cleaning lists for assembling articles into customer groups. The number on each master tag attached to the dry-cleaning list corresponds to the numbers of various articles in a customer's bundle. Put the tags in numerical order and collect all articles belonging to each master tag. Be sure that all articles written on the customer's dry-cleaning list are present and accounted for. Then check to see that all buttons are intact and that belts and buckles are present. Missing buttons should be replaced, and all belts and buckles presented to the laundry should be returned with the cleaned article or replaced when lost.

After you collect and check all items that belong in a customer's bundle, attach the dry-cleaning list, and put the items on the assembly and/or issue rack in numerical order.

As stated previously, the time for pickup by authorized persons is indicated on the dry-cleaning schedule. The hours are stated by divisions and activities and staggered to prevent congestion in the pickup line. Delivery periods should be at stated periods that will not interfere with active dry-cleaning processes in the department.

CARE AND MAINTENANCE OF THE DRY-CLEANING MACHINE

Keep the surfaces of machines in the dry-cleaning unit free of dust. Wash them with hot water and soap or a safe solvent. Apply a light coat of wax to the surfaces of new machines to help keep dirt from adhering to them. Clean the foam filter located in the lint housing daily by brushing the foam material to remove excess lint and washing it with clear water and squeezing it dry. Do not reinstall the filter when it is wet or use soaps or solvents when you clean it.

Check for accumulations of lint on coils when you remove the lint bag in the evening. Clean the pump lint strainer once each week or more often under heavy use. Never remove this strainer for cleaning while the machine is running. Be on the alert for solvent and grease leaks. Occasionally, check the timer with a watch. Make sure maintenance and lubrication charts are followed. Report requirements for maintenance to your supervisor.

MAINTENANCE OF DRY-CLEANING PRESSES

The maintenance of dry-cleaning presses is basically the same as laundry presses. Thoroughly clean them daily and change the pads and covers as required. Padding is so important in the dry-cleaning plant in order to produce a beautifully finished product. The presses are padded in the same manner as conventional presses, one steel wool pad (change once a year), two flannel pads (change the oldest one once a week or as required), and one cover that can either be changed when it shows signs of wear or taken off and washed once a week. All other press maintenance should be done by qualified maintenance personnel. Dry-cleaning personnel should not attempt maintenance on the presses that they are not qualified to perform.

SPOTS AND STAINS

Many spots and stains are removed through the regular washing or dry-cleaning process. Spots on clothing are caused by foods, blood, grease, and so forth. When these spots become set in the material they are considered a stain. The setting of a spot usually is caused by heat or from certain chemical reactions. Once set it cannot be removed without some injury to the fabric. In many cases the injury is so minor that removal is still worthwhile. In other instances, the risk of damage to the fabric is so serious that it's better to leave the stain in the fabric. Therefore, as you will learn, it is very important that spots are identified and treated before they become a stain.

SPOTTING

Any stain that resists the normal washing or dry-cleaning process can usually be removed using a special treatment called spotting. Spotting is a

Table 6-2.—Basic Stain Groups

OIL BASE TYPE

Adhesive Tape	Ink, Marking	Pitch
Airplane Dope	Ink, Printing	Rouge
Asphalt	Lacquer	Rubber Cement
Carbon Paper	Leather	Sauces
Crayon	Lipstick	Shellac
Furniture Polish	Lotions	Shoe Polish
Glue	Mascara	Soot
Grass	Nail Polish	Soup
Gravy	Oil	Tar
Grease	Ointments	Varnish
Hair Dressing	Paint, Latex	wax
Ink, Ball Pen	Paint, Plastic	

PROTEIN TYPE

Albumin	Egg	Milk
Blood	Glue (Animal)	Perspiration
Candy	Ice Cream	Salad Dressing
Catsup	Jelly	Starch
Chocolate	Mayonnaise	Sweets
Cocoa	Mercurochrome	Syrup
Discharge	Merthiolate	Vomit

TANNIN TYPE

Beer	Fruit Juice	Tea
Berry	Liquor	Tobacco
Coffee	Perfume	Wine
Fruit	Soft Drinks	Yellow

MISCELLANEOUS

Rust	Metallic (Other Than Rust)
Dyes	Silver Nitrate
Ink, writing	Photo Developer
	Tarnish

specialized art in which a spot or stain is identified and removed using the proper chemical agent without damaging or affecting the clothing. Aboard ship, basic spotting chemical preparations, which we will discuss later, should be used for removing stains contained in the basic stain groups shown in table 6-2. Stains are easier to remove when they are fresh and, therefore, early identification is essential.

THE SPOTTER

The person who does the actual spotting is called the spotter. The spotter's job is to identify the substance that caused the spot or stain and to know what cleaning agents and type of treatment to use to remove it. Many of the fabrics the spotter handles are expensive. Serious damage to any of them means financial loss as well as inconvenience to the owner. Therefore, the spotter

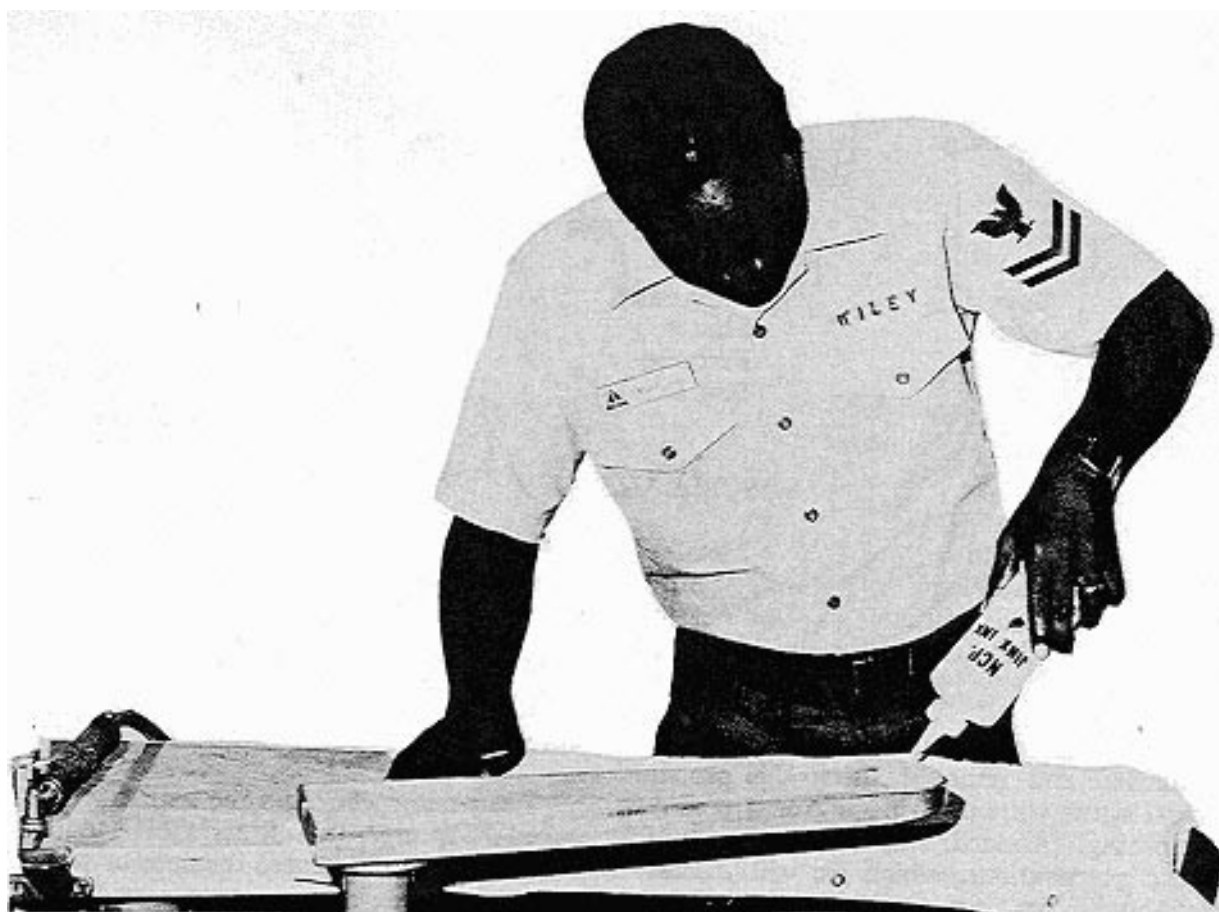
should know before trying to remove a spot or stain that the substance and methods to be used will not destroy the fabric or ruin its appearance. When in doubt about whether a spot or stain can be removed without serious damage to the material, the spotter should contact the supervisor and obtain his or her advice before starting the work. We have indicated earlier that identification and treatment of some spots are necessary to keep them from becoming stains. This is not always possible due to heavy workloads and lack of time to check clothing items. In this case a note should be placed in the plan of the day (POD) by the supply officer asking the owners of articles requiring spotting to tag the articles with a note identifying the spots. This information makes the spotter's job easier, faster, and more accurate. It also alerts the spotter to do spotting before dry cleaning.

SPOTTING TOOLS AND EQUIPMENT

The spotter must know and understand the equipment and tools used in spotting operations in order to get the best possible results. Spotting tools and equipment consist of the spotting board assembly—main spotting board, sleeveboard, garment tray, chemical tray, and spotting gun; spotting brushes; spatula; chamois and towels; cheesecloth and blotters; magnifying glass; soap solution containers; and spotting bottles and agents.

Main Spotting Board

The main spotting board is the spotter's worktable. (See fig. 6-15.) It is shaped like an



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Figure 6-15.-Spotter using the spotter board.

ironing board to provide large and small work spaces for articles of different sizes. The board is usually a combination of a smooth area and a perforated or screened area. The smooth surface is hard and usually made of glass, marble, or Monel metal, all of which are resistant to alkalies and acids. The smooth area is used for tamping and for applying spotting agents. The perforated or screened area is used for flushing. The perforated area must be taken apart and steam-cleaned each day to remove excess chemicals or dyes.

Sleeveboard

The sleeveboard is mounted about 6 inches above the level of the main spotting board. The sleeveboard, like the main spotting board, also has a flushing and tamping area. The sleeveboard is attached to the main board by a movable arm that can be adjusted. This board is used when working out stains on sleeves and other small areas. Clean the sleeveboard in the same manner as the main spotting board.

Garment Tray

The garment tray is under the main spotting board, midway between the board and the floor. The tray must always be clean; otherwise, the garment resting in it will be soiled.

Chemical Tray

All the basic spotting agents are placed on the chemical tray.

Spotting Gun

The spotting gun is used for removing spots or stains from wool, silk, and synthetics. The gun is adjusted so that slight pressure on the steam pedal provides steam and more pressure provides hot water or wet steam. If compressed air is piped to the spotting board, it will come through the gun when the appropriate foot pedal is depressed. When vacuum is piped to the spotting board, it is controlled by a foot pedal. However, the vacuum is piped to the perforated area of the board to dry and hold the garment in place while spotting. The spotting gun must be held about 4 inches above the garment. If the gun is held closer than 4 inches from the fabric, the steam or air pressure at 70 to 80 pounds per square inch can cause permanent damage to the fabric. The

spotting gun should be held perpendicular when blowing the chemicals or spots off a garment. Before using the spotting gun, point it toward the deck and depress the steam pedal to remove excess condensation. The spotting gun must be cleaned daily and all chemicals removed from the nozzle.

Spotting Brushes

Spotting brushes help break up stains so that spotting agents can penetrate into and around the stains. When the spotting brush is not being used, the bristles should be pointed downward to allow the agents to drain from the bristles. The brush can also be placed in the brush holder to obtain similar results. When the brushes are used for tamping, the bristles should hit the fabric flat to prevent damaging the fabric. Never brush or scrub the spot.

Spotting brushes usually come in two sizes (2-inch and 3-inch) and two colors (black and white) and are made of nylon bristles. The large brush is used mainly on woollens and synthetics because the bristles are spread far apart. The small brush has a close set of bristles and is effective on silk. The black-bristled brush is used for dry-side spotting and for dark-colored fabrics. The white-bristled brush is used for wet-side spotting and light-colored fabrics. After a brush is used on a garment, clean the brush with the spotting gun.

Spatula

The spatula is made of stainless steel, bone, or ivory and is about 1 inch wide and 5 inches long. The spatula is usually pointed on one end and rounded at the other end and is used to manipulate chemicals, soften the stain, and to get better penetration. The pointed end should not be used because it will dig into the fabric and distort it. The rounded end should be used for better results. After each use the spatula should be cleaned.

Chamois and Towels

A thick, heavy chamois is used for absorbing water and spotting solutions as they are removed from fabrics. The chamois should be spread smoothly over the portion of the spotting board being used. A medium-weight Turkish towel serves the same purpose. By absorbing cleaning chemicals, particularly acids, the absorbent prevents pitting of the spotting board. Keep

chamois cloths or Turkish towels available for this purpose.

Cheesecloth and Blotters

Cheesecloth, because it is soft and absorbent, is used in spotting or feathering out—picking up all the moisture around a spot just removed. This prevents rings from forming. Chamois, because of its heavy texture, is not good for feathering out.

You can use blotters for absorbing materials rinsed from the garment. You can also use them to test the resistance of dyes in fabrics to cleaning chemicals and/or spotting agents. Put a small portion of fabric on a blotter and apply the chemical or spotting agent. The amount of coloring matter dissolved by the chemical and absorbed by the blotter indicates the effect of the chemical on the dye.

Magnifying Glass

When in doubt about the substance that caused a spot or stain, a spotter may examine it under a magnifying glass. Although an inexperienced spotter may get few results with a magnifying glass at first, through practice the spotter will learn to identify various substances as they appear when magnified.

The magnifying glass is used to observe the weave and imperfections of the fabric and to determine if a discoloration on the garment is a spot or damaged fibers. It helps to determine the kind of spot or stain and to observe the action of the spotting chemical. The glass can also be used to determine whether a spot has a staining substance or whether the spot has a chafed area with loss of dye. The magnifying glass will help you determine if the stained area is too weak to stand treatment and if a spot on a synthetic fabric was caused by heat damage.

Soap Solution Containers

Usually each spotting board has two containers to hold soap solutions. The containers should be cleaned daily.

Spotting Bottles and Agents

Spotting bottles and chemical agents are held in a tray at the right end of the spotting board. Dropper bottles with ground glass stoppers and rubber bulb pipettes are preferred. These types of bottles control the chemicals and conserve

materials. However, on board ship, squeeze-type containers with a dropper top have been found to be more convenient and satisfactory from the standpoint of handling and breakage. The chemical agents commonly used to remove spots and stains are listed in table 6-3. Their characteristics and uses are given, and also the precautions you should take with them.

IDENTIFYING SPOTS AND STAINS

Once you have learned the basic uses of the equipment, tools, and chemical agents, you must be able to determine what the spot or stain is before you try to remove it. Through experience as a spotter, you will be able to easily identify spots and stains. Until you learn, you must be careful because if you try to remove a spot or stain before properly identifying it you may damage the clothing by using the wrong chemical or spotting technique. Listed below are several ways to identify a spot:

Sight—Sight is the most important and the quickest way to identify a spot or stain. Is the spot built up, built up and absorbed, or absorbed and visible on the back side? What is its shape? Is it dull or shiny, smooth- or rough-surfaced, or is it rugged with uneven edges? What is the color?

Feeling—Is the spot hard, soft, sticky, or brittle? Does it become white when scratched?

Odor—Sometimes the odor is so prominent that positive identification of the spot or stain is possible without the use of other guides. Sometimes a drop of water or a feather of steam is required to intensify the odor so you can positively identify what it is.

Location—Food spots are usually found on the front of the garment and on the underside of cuffs and sleeves. Perspiration stains are found under arms, across the back and shoulders, knees, and the seat of trousers. Leg makeup, mud, and shoe polish are found on the lower part of the skirt and coats or legs and cuffs of trousers.

Solvent test—Solvent tests are used to determine whether the spot or stain should be removed by water or dry solvent. If the appearance indicates the spot or stain was spread

Table 6-3.—Chemicals Used in Spotting

Name	Characteristics	Uses	Precautions
Acetic acid, 28%	Clear, colorless liquid, pungent odor	To neutralize alkalis; to restore color; as general spotting agent	Bleeds basic dyes.
Acetone	Colorless, volatile liquid with agreeable odor; flammable	Solvent for stains from oils, resins, paints, varnishes, and nail polishes	Dissolves cellulose ace- tate and some basic dyes.
Ammonia	Colorless liquid of water and dissolved ammonia gas; evapo- rates	To neutralize acids; to restore color	Bleeds acid dyes and some direct dyes; at full strength, yellows white silk or wool.
Amyl acetate	Colorless liquid with banana odor; flam- mable	Solvent for paint, lac- quer, nail polish	Chemically pure is harmless; commercial or technical grade may damage cellulose acetate.
Amyl alcohol	Clear, colorless liquid; flammable	Solvent for formalde- hyde resins	Harmless to all fabrics; bleeds some basic dyes.
Benzaldehyde	Colorless, fragrant, volatile liquid	Removes blacking, hair dye, and some types of shoe polish	Affects cellulose acetate; bleeds some basic dyes
Digestive agents	White or yellow powder	Convert albumins, starches, and sugars into simpler com- pounds which can be removed	Safe on all fabrics and dyes unaffected by water.
Hydrochloric acid	Clear, colorless or slightly yellow, pungent liquid	Diluted, to remove dye and ink stains, and metallic soap stains	Concentrated, it injures all fabrics and bleeds basic dyes.
Hydrogen peroxide (3 %)	Clear, colorless liquid	Spot bleaching; and small areas, on spotting board	Safe in dilute form.
Oxalic acid	Powder	Removes rust	Poison.
Potassium iodide	White crystalline or powdered substance	Removal of silver nitrate and other silver stains	Safe on all fabrics and dyes. Should be rinsed well

Table 6-3.—Chemicals Used in Spotting—Continued

Name	Characteristics	Uses	Precautions
Sodium chloride Common salt . . .	White, powdered or granular substance	Helps to remove blood and fruit stains	Safe on all fabrics if properly rinsed. Has setting action on direct dyes
Sodium hypochlorite	Clear, colorless, or slightly yellow liquid	Bleach for vegetable and synthetic fibers; to remove blood, blue stains, grass stains, indelible pencil, mildew and molds, medicine, and perspiration stains	Discolors animal fibers. Strong solutions will injure vegetable fibers. Follow treatment with a sour.
Sodium thiosulfate.	Whitish, slightly opaque, crystalline substance	To remove iodine stains	Safe on all fabrics and dyes if rinsed well after using.
1, 1, 1-Trichloroethane (Methyl chloroform)	Colorless, nonflammable liquid	General spotting agent for oil and grease stains	Safe on all fabrics. If warm, may bleed cellulose acetate dyes.

by oil, solvent may remove the spot or stain. An ink spot may be tested as follows:

- Add a drop of water to the ink spot. If the ink bleeds easily, it is considered to be water soluble.

- Add a drop of ammonia to the spot. More color should bleed from the spot.

- Add a drop of acetic acid to the spot. If no more color bleeds, then remove the ink spot by a water and ammonia process of bleeding and flushing until spot is completely removed.

- If water does not bleed the ink spot, add dry solvent. If the ink bleeds, then the ink spot is ball-point, marking, Mimeograph, or printing ink, which must be removed on the dry side. Continue bleeding and flushing until spot is removed.

Chemical tests—Litmus paper indicates the presence of acid or alkali. Tannin can be discovered by applying a drop of ammonia to a spot or stain and noting whether the color turns tan or brown. The change to tan or brown

indicates the presence of tannin. Wine and berry stains are distinguished from ink stains by a discharge of color. The color of wine and berry stains will change from blue to red and back to blue with alternate applications of ammonia and acid.

METHODS USED IN SPOTTING

The spotter removes spots and stains by using one or more of four following methods:

- Solution
- Emulsification
- Chemical action
- Mechanical action

SOLUTION

A solution is a mixture of two substances, the solvent and the solute. A solution occurs when the solute is dissolved in the solvent. The most common way to remove soils and spots from

Table 6-4.—Spot and Stain Removal Chart

GROUP NO. 1—Albuminous and Simple Food Stains

Spot	Appearance	Removal Steps
(1) Food	Built up, dark, turns white when scratched	<u>Step No. 1</u> (A) Dampen area with water or steam. (B) Apply neutral lubricant or protein type agent. (C) Tamp with brush, flush with water or steam.
(2) Starches	Built up	
(3) Perspiration	Absorbed	
(4) Blood	Dull, absorbed, reddish brown	<u>Step No. 2</u> (A) Dampen area with water or steam. (B) Apply ammonia (WHITE MATERIAL ONLY). (C) Tamp with brush, flush with water or steam.
(5) Mud	Dull, absorbed	
(6) Discharge	Absorbed, built up, dark or white	
(7) Glue	Built up	<u>Step No. 3</u> (A) Dampen area with water or steam. (B) Apply wet spotter. (C) Tamp with brush, flush with water or steam.
(8) Ice Cream	Dull, absorbed	
(9) Sweets	Built up, dark to white	
		<u>Step No. 4</u> (A) Dampen area with water or steam. (B) Apply digest powder. (C) Leave digester on stain for at least 15 min. (D) Flush with water or steam.

fabrics is to dissolve them in solvents. In washing, water is the chief solvent, while in dry cleaning, perchloroethylene is the chief solvent. Most substances will dissolve in either solvent mentioned above; however, many will not. These substances can be removed using appropriate chemicals. Table 6-4 is a spot and stain removal chart that lists different types of spots and stains and the steps and procedures for removing them. The chemicals used in spot removal will mix with the substance to loosen it so it may be rinsed away. Any clothing articles that are spotted after the wash or dry-cleaning cycle will have to be sent through the cycle again to rinse away any chemicals still remaining in the article. This should be done before you dry or press the material.

EMULSIFICATION

Any substances that help the solvent in removing stains such as soap or detergent are

called emulsifiers. In dry cleaning, emulsifiers are already part of the dry-cleaning solvent; however, in regular washing, emulsifiers should be added to the solvent (water) to assist it in efficient stain removal.

CHEMICAL ACTION

In chemical action, two or more substances combine to produce one or more totally new substances. These new substances are normally very soluble and can be rinsed away easily. A good example of this is when you use an acid to remove an alkaline spot or use an alkali, like ammonia or sodium bicarbonate, to remove an acid spot. When you do this the two substances react chemically to form a soluble salt that can be rinsed out of the fabric easily.

Table 6-4.—Spot and Stain Removal Chart—Continued

GROUP NO. 2—Stains Containing Tannin.

Spot	Appearance	Removal Steps
(1) Coffee	Dull, absorbed	<u>Step No. 1</u> (A) Dampen the area with water. (B) Apply neutral lubricant or tannin type agent. (C) Tamp with brush, flush with water or steam.
(2) Tea	Absorbed	
(3) Liquor	Dull, absorbed	
(4) Beer	Dull, absorbed, ring around the outside	<u>Step No. 2</u> (A) Dampen area with water. (B) Apply neutral lubricant and 28% acetic acid. (C) Tamp with brush, flush with water or steam.
(5) Soft drinks	Absorbed	
(6) Fruit juices	Dull, absorbed	<u>Step No. 3</u> (A) Dampen the area with <u>cold water</u> . (B) Apply the general formula. (C) Tamp with brush, flush with <u>cold</u> water only.
(7) Medicine	Absorbed	
(8) Grass	Smeared, dull absorbed	<u>Step No. 4</u> (A) Dampen the area with water or steam. (B) Apply rust remover. (C) Never allow rust remover to come into contact with spotting board. (D) Flush with water or steam.
		<u>Step No. 5</u> (A) Dampen the area with water or steam. (B) Apply digest powder. (C) Allow digester to remain on stain for at least 15 min. (D) Flush with water or steam.
		<u>Step No. 6</u> (A) Dampen the area with water or steam. (B) Spot bleach (Oxidizing). (C) Flush with water or steam.

Chemicals must always be used very carefully because of the danger that they will affect the dye or damage the fibers. Note that in several instances in table 6-4, it is recommended that other methods be tried first and the chemicals used only for persistent stains.

MECHANICAL ACTION

Mechanical action is the simplest method of spot removal and an aid to all other methods.

Mechanical action in spotting is done by using a brush, spatula, sponge, or spray gun to work a cleansing agent into the fabric. The important thing to remember about all mechanical action is that it tends to wear or damage the fabric. Never use more force than is necessary and continue the action only as long as necessary. Consider how the various fibers react to mechanical action (for instance, felting of wool) and avoid actions that will injure them. The spatula particularly

Table 6-4.—Spot and Stain Removal Chart—Continued

GROUP NO. 3—3 Miscellaneous Stains—Dye, Ink (Wet and Dry), and Rust.

Stain	Appearance	Removal Steps
(1) Ink (nonpermanent). . . .	Absorbed	<u>Step No. 1</u> (A) Dampen area with water. (B) Apply rust remover or oil base type agent. (C) Flush area with water or steam,
(2) Ink (permanent)	Absorbed	<u>Step No. 2</u> (A) Dampen area with water (B) Apply neutral lubricant and acetic acid or oil base type agent. (C) Absorb ink with a blotter. (D) Flush area with water or steam.
(3) Dye stains	Absorbed	<u>Step No. 3</u> (A) Dampen area with <u>cold water</u> . (B) Apply general formula. (C) Tamp with brush. (D) Flush out with water or steam. <u>Step No. 4</u> (A) Dampen area with water. (B) Apply neutral lubricant and ammonia. (C) Absorb with a blotter. (D) Flush area with water or steam. (E) Dry area completely. (F) Bleach (reducing).
(4) Rust	Absorbed, reddish color	<u>Step No. 1</u> (A) Flush area with water or steam. (B) Apply rust remover. (C) Flush area with water or steam.

can cause damage to fabric when not used properly.

STAIN REMOVAL SAFETY PRECAUTIONS

As with any job there are certain precautions you should use when removing stains. They include the following:

1. Stain removal should take place under the best possible light conditions and with adequate ventilation.

2. Always examine the spot first and try, if possible, to determine what substance caused it. This procedure was discussed earlier.

3. Always make sure the solvent you are treating the spot with will not affect the garment. This is done by doing a preliminary test in a hidden portion of the garment as we discussed earlier.

4. CAUTION: Never use chlorine bleach or alkalies on any material containing silk, wool, or any other animal fiber.

5. If you are spotting rayon articles, never treat them with organic solvents unless resistance to the treatment is known by a preliminary test on an unexposed portion of the garment.

6. When using chemical agents always allow ample time for the agent to start to act on a spot before trying to remove it.

7. When you use the spatula to help the cleaning formula to penetrate the spot, be careful. Rub the spatula back and forth across the spot using short smooth strokes without applying too much pressure. This will prevent damage to the fabric.

8. Always use the proper spotting brush as we discussed earlier. The spotting brush should be used in the same manner as the spatula to prevent damage to the fabric.

9. Avoid excessive friction when treating silk or rayon fabrics. Where some friction is necessary, it is recommended you use the wrong side of the garment.

10. Do not use the spatula on silk or synthetic fabrics. The pressure you can apply on it without causing damage to the fabric will be insufficient to do any good.

11. When you remove spots and stains from delicate fabrics, you should place the stained portion of the garment over a pad of clean cloth or a white blotter and apply the cleaning solution with a squeeze bottle, a medicine dropper, or a cleaning sponge may also be used. Allow sufficient time for the cleaning solution to penetrate, but remove it as soon as possible to prevent damage.

12. All chemical agents used in spotting must be rinsed from the fabric thoroughly before you dry or press the fabric.

SPOTTING FORMULAS

Spotting agents are normally available in the *Ship's Store Contract Bulletin*. Ample supplies of spotting agents should be obtained before your ship deploys overseas or leaves port for an extended period of time. The spotting formulas listed in table 6-5 are the ones generally used for removing spots and stains for the purpose indicated. They are included in this chapter for your information and should be used when satisfactory commercial products are not available. All ingredients of these formulas are generally available aboard ship.

Table 6-5.—Spotting Formulas

Formula	Chemical Composition	When Used
General Formula	Amyl acetate 1 part Glacial acetic acid 99% ½ part Lactic acid 1 part Oxalic acid crystals (by weight) ½ part Synthetic methanol 1 part	Used with water to remove ink, tannin, berry, lipstick, and dyestuff stains, or stains that contain dyestuff. Safe on all fabrics when cold, but not on all dyestuffs.
Paint remover	Chloropicrin (Use as prescribed by the manufacturer)	Good for removing all kinds of paint and similar substances. Evaporates completely.
Prespotting soap	Ammonia (26%) ½ part Hexalin 2 parts Oleic acid 3 parts Water (distilled) 1½ parts (Can use plain water.)	Used on paint, oil, tar, road oil, and asphalt to prevent SETTING during the dry-cleaning process. Blood and tannin stains should be removed by water before you dry clean.
Wet spotters	Acetone 1 part Castile soap 6 parts Chloroform 1 part Ethyl acetate 1 part Synthetic methanol 1 part Water 1 part	Wet and dry solvents are used to remove soil, paint oils, and greases. For very severe stains, or large areas, DO NOT USE wet spotters.